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<b>TRANSMITTAL FORM</b> <i>(to be used for all correspondence after initial filing)</i>	Application Number	10/796,806
	Filing Date	3/9/04
	First Named Inventor	Mabe
	Art Unit	3676
	Examiner Name	Williams
Total Number of Pages in This Submission	Attorney Docket Number	7784-000704

ENCLOSURES (check all that apply)				
<input checked="" type="checkbox"/> Fee Transmittal Form  <input checked="" type="checkbox"/> Fee Attached  <input type="checkbox"/> Amendment / Reply  <input type="checkbox"/> After Final  <input type="checkbox"/> Affidavits/declaration(s)  <input type="checkbox"/> Extension of Time Request  <input type="checkbox"/> Express Abandonment Request  <input type="checkbox"/> Information Disclosure Statement  <input type="checkbox"/> Certified Copy of Priority Document(s)  <input type="checkbox"/> Response to Missing Parts/Incomplete Application  <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s)  <input type="checkbox"/> Licensing-related Papers  <input type="checkbox"/> Petition  <input type="checkbox"/> Petition to Convert to a Provisional Application  <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address  <input type="checkbox"/> Terminal Disclaimer  <input type="checkbox"/> Request for Refund  <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> After Allowance Communication to Technology Center (TC)  <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences  <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)  <input type="checkbox"/> Proprietary Information  <input type="checkbox"/> Status Letter  <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):  <b>Appeal Brief Under 37 C.F.R. §41.37</b>		
<table border="1"><tr><td>Remarks</td><td>The Commissioner is hereby authorized to charge any additional fees that may be required under 37 CFR 1.16 or 1.17 to Deposit Account No. 08-0750. A duplicate copy of this sheet is enclosed.</td></tr></table>			Remarks	The Commissioner is hereby authorized to charge any additional fees that may be required under 37 CFR 1.16 or 1.17 to Deposit Account No. 08-0750. A duplicate copy of this sheet is enclosed.
Remarks	The Commissioner is hereby authorized to charge any additional fees that may be required under 37 CFR 1.16 or 1.17 to Deposit Account No. 08-0750. A duplicate copy of this sheet is enclosed.			

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm or Individual name	Harness, Dickey & Pierce, P.L.C.	Attorney Name Mark D. Elchuk	Reg. No. 33,686
Signature			
Date	June 12, 2006		

CERTIFICATE OF TRANSMISSION/MAILING			
I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.			
Typed or printed name	Mark D. Elchuk	Express Mail Label No.	EV 853 856 560 US (6/12/2006)
Signature		Date	June 12, 2006

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

EV 853 856 560 US

**FEE TRANSMITTAL  
for FY 2006**

Effective 2/8/2006. Patent fees are subject to annual revision.

Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 500

**Complete if Known**

Application Number	10/796,806
Filing Date	3/9/04
First Named Inventor	Mabe
Examiner Name	Williams
Art Unit	3676
Attorney Docket No.	7784-000704

**METHOD OF PAYMENT (check all that apply)**
☒ Check ☐ Credit card ☐ Money ☐ Other ☐ None  
Order
☒ Deposit Account:Deposit  
Account  
Number  
08-0750Deposit  
Account  
Name  
Harness, Dickey & Pierce, PLC

The Director is authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☒ Credit any overpayments  
☒ Charge any additional fee(s) during the pendency of this application  
☐ Charge fee(s) indicated below, except for the filing fee  
to the above-identified deposit account.
**FEE CALCULATION****1. BASIC FILING FEE**

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1011	300	2011	150	Utility filing fee	
1012	200	2012	100	Design filing fee	
1013	200	2013	100	Plant filing fee	
1014	300	2014	150	Reissue filing fee	
1005	200	2005	100	Provisional filing fee	

SUBTOTAL (1)

(\$) 0

**2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE**

Total Claims	Extra Claims	Fee from below	Fee Paid
20 **	0	X	0
3 **	0	X	0
Multiple Dependent			0

Large Entity		Small Entity		Fee Description
Fee Code	Fee (\$)	Fee Code	Fee (\$)	
1202	50	2202	25	Claims in excess of 20
1201	200	2201	100	Independent claims in excess of 3
1203	360	2203	180	Multiple dependent claim, if not paid
1204	200	2204	100	** Reissue independent claims over original patent
1205	50	2205	25	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2)

(\$) 0

\*\*or number previously paid, if greater; For Reissues, see above

**FEE CALCULATION (continued)****3. ADDITIONAL FEES**

Large Entity Small Entity

Fee Code	Fee (\$)	Fee Code	Fee (\$)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	120	2251	60	Extension for reply within first month	
1252	450	2252	225	Extension for reply within second month	
1253	1020	2253	510	Extension for reply within third month	
1254	1,590	2254	795	Extension for reply within fourth month	
1255	2,160	2255	1080	Extension for reply within fifth month	
1401	500	2401	250	Notice of Appeal	500
1402	500	2402	250	Filing a brief in support of an appeal	
1403	1000	2403	500	Request for oral hearing	
1452	500	2452	250	Petition to revive - unavoidable	
1453	1500	2453	750	Petition to revive - unintentional	
1462	400	1462	400	Petition fee under 37 CFR 1.17(f)	
1463	200	1463	200	Petition fee under 37 CFR 1.17(g)	
1464	130	1464	130	Petition fee under 37 CFR 1.17(h)	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	790	2809	395	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	790	2810	395	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	790	2801	395	Request for Continued Examination (RCE)	

Other fee (specify) \_\_\_\_\_

\*Reduced by Basic Filing Fee Paid

SUBTOTAL (3)

(\$)500

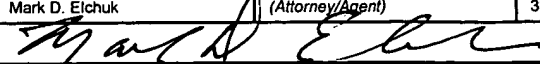
**4. SEARCH/EXAMINATION FEES**

Fee Code	Fee (\$)	Fee Code	Fee (\$)	Fee Description
1111	500	2111	250	Utility Search Fee
1112	100	2112	50	Design Search Fee
1113	300	2113	150	Plant Search Fee
1114	500	2114	250	Reissue Search Fee
1311	200	2311	100	Utility Examination Fee
1312	130	2312	65	Design Examination Fee
1313	160	2313	80	Plant Examination Fee
1314	600	2314	300	Reissue Examination Fee

SUBTOTAL (4)

(\$)0

**SUBMITTED BY****Complete (if applicable)**

Name (Print/Type)	Mark D. Elchuk	Registration No. (Attorney/Agent)	33,686	Telephone	2486411600
Signature		Date	June 12, 2006		

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6 -13-06

AT/MS



**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 10/796,806  
Filing Date: March 9, 2004  
Applicant: James H. Mabe  
Group Art Unit: 3676  
Examiner: Mark A. Williams  
Title: HINGE APPARATUS WITH TWO-WAY CONTROLLABLE  
SHAPE MEMORY ALLOY (SMA) HINGE PIN ACTUATOR AND  
METHODS OF MAKING TWO-WAY SMA PARTS  
Attorney Docket: 7784-000704US

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**APPEAL BRIEF**  
**UNDER 37 C.F.R. § 41.37**

Sir:

The Notice of Appeal in this Application was mailed on May 1,  
2006. This brief is submitted with the fee required under 37 C.F.R. §1.17(f).

06/14/2006 FHETEKI1 00000016 10796806

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## **APPELLANT'S BRIEF ON APPEAL**

Pursuant to 37 C.F.R. § 41.37, this Brief on Appeal is submitted as follows:

### ***REAL PARTY IN INTEREST – UNDER 37 C.F.R. § 41.37(c)(1)(i)***

The real party in interest in this appeal is The Boeing Company, a corporation of the State of Delaware, having its principal place of business at 100 North Riverside Plaza, Chicago, Illinois 60606-1596, by virtue of an assignment recorded August 23, 2003 at Reel 013236, Frame 0096.

### ***RELATED APPEALS & INTERFERENCES - UNDER 37 C.F.R. § 41.37(c)(1)(ii)***

To the best of Appellant's knowledge, no other appeals or interferences are pending which will directly affect, be directly affected by or have a bearing on the Board's decision in the present pending appeal.

### ***STATUS OF THE CLAIMS – UNDER 37 C.F.R. § 41.37(c)(1)(iii)***

On May 1, 2006, Appellant appealed from a final rejection of claims 35-45.

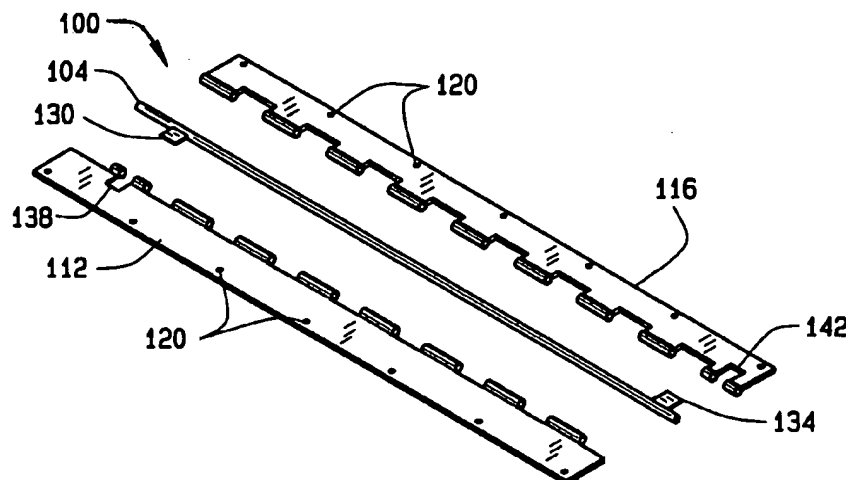
- A copy of the claims presently being appealed (i.e., Claims 35-45) is provided in the attached "Claims Appendix".
- A copy of the final Office Action mailed January 18, 2006 placing the present application under final rejection is provided in the attached "Evidence Appendix".
- A copy of Japanese Patent JP 408228910 A (the '910 Patent) is provided in the attached "Evidence Appendix".

**STATUS OF AMENDMENTS – UNDER 37 C.F.R. § 41.37(c)(1)(iv)**

A final Office Action was mailed January 18, 2006. In response thereto, Appellant filed a Notice of Appeal on May 1, 2006. No other papers besides the above-mentioned "Notice of Appeal", and the present appeal brief, have been submitted by the undersigned; therefore, there are no papers connected with the present application that remain "unentered" in the present application.

**SUMMARY OF THE CLAIMED SUBJECT MATTER – UNDER 37 C.F.R. § 41.37(c)(1)(v)**

The present application discloses a hinge apparatus 100 having a pin 104 comprising a two-way Shape Memory Alloy (SMA), with each end being rigidly secured to a respective hinge leaf panel 112,116. (Paragraph 25 of the application). For convenience, Figure 1 of the application is shown below.



When thermally activated or heated, the two-way SMA material of the SMA hinge pin 104 begins a martensite-to-austenite transformation during which the SMA hinge pin 104 rotates or twists in a first rotational direction, thus rotating the hinge leafs 112,116 (for example, away from each other). (Paragraph 29 of

(a) the application). Upon cooling of the SMA pin 104, the two-way SMA material begins an austenite-to-martensite transformation during which the SMA hinge pin 104 rotates in a second rotational direction opposite to the first rotational direction. (Paragraph 31 of the application). When the hinge apparatus 100 is used with a door, the rotating SMA hinge pin 104 applies an opening force for rotating the door 124 in the first rotational direction, as its SMA material assumes its austenitic state (Paragraph 44 of the application). To controllably move the door 124 in an opposite or second rotational direction, the two-way SMA material of the SMA hinge pin 104 can be cooled to cause the two-way SMA material to assume its martensitic state. (Paragraph 45 of the application). Thus, the rotation of the hinge leaf panels 112,116 relative to each other occurs only upon twisting of the SMA hinge pin 104, which is rigidly secured via tabs 130 and 134 to the hinge leaf panels 112,116. (Paragraph 45 of the application). Importantly, a twisting force (or torque) is provided by the hinge pin 104 when moving the door in both directions.

***GROUND OF REJECTION TO BE REVIEWED ON APPEAL – UNDER 37 C.F.R. § 41.37(c)(1)(vi)***

Appellant presents the following issue for review:

Whether Claims 35, 36, 41-43, and 45 are anticipated under 35 U.S.C. § 102(b) by Japanese Patent JP 408228910A (the '910 Patent).

***ARGUMENT – UNDER 37 C.F.R. § 41.37(c)(1)(vii)***

Pursuant to 37 C.F.R. § 41.37(c)(1)(vii), the following provides the contentions of Appellant with respect to the sole ground of rejection above

presented for review in accordance with 37 C.F.R. § 41.37(c)(1)(vi).

### The '910 patent

The '910 patent is directed to a cooking bowl 1 having a cover 2 and a pot body 3. The cover 2 is pivotally attached to a plate 9, which is supported within an area 12 of the pot body 3. A pair of shape memory alloy (SMA) pins 7 are associated with the cover 2 and the plate 9. Ends 7c of the SMA pins 7 are formed to contact the plate 9. Ends 7b of the SMA pins 7 extend through openings in the cover 2. Heat generated during a cooking process heats the SMA pins 7, which causes them to twist, thus lifting the cover 2. After cooking is completed, and as the SMA pins 7 cool down, gravity causes the cover 2 to drop back down on to the body 3.

It will be noted that the SMA pins 7 are not fixedly secured at their ends 7c, which permits the cover 2 to be lifted without causing any twisting of the SMA pins 7. However, this coupling configuration does not allow the SMA pins 7 to positively urge the cover 2 back into its closed position.

### The Claimed Subject Matter

Claim 35 recites that the end portions of the two-way SMA pin 104 of the present application are rigidly secured to the first and second hinge leafs 112,116. This allows for transfer of torque in both clockwise and counterclockwise directions from the two-way SMA pin 104 to one of the hinge leafs 112,116, relative to the other of the hinge leafs. Thus, the hinge leafs 112,116 do not pivot about the SMA pin 104, but rather pivot only when the two-way SMA pin 104 twists. Twisting occurs when the temperature of the two-way

SMA pin 104 changes from the austenite temperature to the martensite temperature of the SMA material that comprises the SMA pin 104. Twisting of the SMA pin 104 also occurs when the temperature changes from the martensite temperature to the austenite temperature of the SMA material.

Claim 41 similarly recites that the first and second tabs at opposite end portions of the two-way SMA hinge pin 104 are rigidly secured to the respective first and second hinge leafs 112,116, such that the hinge leafs do not pivot about the SMA pin, but rather pivot when the two-way SMA hinge pin twists.

#### Differences Between the '910 Patent and the Claimed Subject Matter

It would be counter-intuitive for the pin 7 in the '910 reference to be rigidly secured at both ends, because opening the cover 2 to put rice into the pot 3 would then require heating the pins 7 to cause the pins to twist and open the cover 2. The intention of the '910 reference is to be able to manually pivot the cover 2 about the pins 7 (without twisting the pins) to permit placement of rice into the pot 3, before cooking begins. Gravity is also necessary to provide a force to act on the cover 2 to close the cover 2. As such, the cover 2 needs to be able to pivot without twisting the SMA pins 7. Since the SMA pins 7 are not rigidly secured to both the plate 9 and the cover 2 in the '910 patent, the SMA pins 7 **cannot apply a torque in both an opening direction and a closing direction.**

In the final Office Action, the Examiner has taken the position (in note 1; page 2) that the two-way SMA pins 7 in the '910 patent cause the hinge apparatus to apply a **closing force** to the device coupled to the hinge apparatus.



This is simply incorrect. To the contrary, the SMA pins 7 in the Japanese '910 patent can only twist to **provide an opening force**. Again, this is because the SMA pins 7 each have an end secured to the cover 2, but neither has an end rigidly secured to the plate 9 (the ends 7c only make contact with plate 9). Thus, the cover 2 may be pivoted about the pins 7 without twisting the pins 7, since the end of each pin 7 adjacent the plate 9 is not rigidly secured to the plate 9.

Importantly, and in contrast to the configuration of the '910 patent, the ends of the claimed SMA pin 104 are rigidly secured to each hinge leaf 112,116. In this manner, the SMA pin 104 is able to provide a torque in either direction for pivoting the hinge leafs relative to each other when the SMA pin 104 twists, which occurs when the temperature of the SMA pin 104 changes between its austenite and martensite temperatures. The hinge leafs 112,116 of the claimed hinge apparatus 100 **do not pivot about the SMA pin 104**, but rather **pivot relative to each other when the SMA pin 104 twists to apply a torque in either rotational direction**.


Appellant further submits that it would not have been obvious to rigidly secure the hinge leafs 112,116 to the ends of the SMA pin 104, in view of the '910 patent, because with the '910 patent, this would clearly necessitate the individual working against the biasing force of the SMA pin 7 when opening the cover 3 to place uncooked food in the pot 3.

The hinge apparatus 100 of the present application, since it permits movement of the hinge leafs 112,116 only upon twisting of the SMA pin 104, and since the SMA pin 104 is able to apply a torque in two opposite rotational

directions, enables applications that would not be feasible with the hinge structure of the '910 patent. For example, the hinge apparatus 100 can be used to replace a conventional hinge and mechanized actuator in a satellite, where gravity cannot be relied on to close a door. The hinge apparatus 100 would eliminate or reduce the need for a separate, conventional mechanized actuator to pivot a hinged door back into its initial position.

With regard to dependent claims 36-40 and 42-45, these claims each depend directly or indirectly from one of independent claims 35 or 41, which Appellant believes to be allowable in view of the foregoing arguments. Accordingly, Appellant respectfully requests reversal of the rejections of all of the pending claims.

Respectfully submitted,

  
Mark D. Elchuk, Reg. No. 33,686

Date: June 12, 2006

HARNESS, DICKEY & PIERCE, P.L.C.  
P.O. Box 828  
Bloomfield Hills, Michigan 48303  
(248) 641-1600  
MDE/jo

**CLAIMS APPENDIX**

***UNDER 37 C.F.R. § 41.37(c)(1)(viii)***

1-34. (Cancelled)

35. (Previously Presented) A piano hinge defining a hinge line, the piano hinge comprising a two-way shape memory alloy (SMA) positioned along the hinge line to form a pin that at least partially twists when the two-way SMA pin changes between an austenite temperature and a martensite temperature, first and second hinge leafs defining a passage into which the two-way SMA pin fits, and a key-spline arrangement rigidly securing each respective end portion of the two-way SMA pin to the first and second hinge leafs respectively to provide for transfer of torque in both clockwise and counterclockwise directions from the two-way SMA pin to one of the hinge leafs relative to the other of said hinge leafs, whereby the piano hinge leafs do not pivot about the SMA pin but pivot when a torque is applied in response to the two-way SMA pin twisting as the temperature of the two-way SMA pin changes between the austenite temperature to the martensite temperature.

36. (Previously Presented) The piano hinge of claim 35, wherein the hinge leafs include alignable knuckles that define the passage into which the two-way SMA pin fits.

37. (Previously Presented) The piano hinge of claim 35, wherein the two-way SMA is configured to apply torque within a range of about 27 inch pounds and about 1740 inch pounds.

38. (Previously Presented) The piano hinge of claim 35, wherein the two-way SMA is configured to apply torque within a range of about 27 inch pounds and about 1010 inch pounds.

39. (Previously Presented) The piano hinge of claim 35, wherein the two-way SMA is configured to apply torque within a range of about 1010 inch pounds and 1740 inch pounds.

40. (Previously Presented) The piano hinge of claim 35, wherein the two-way SMA is configured to apply torque at about 1740 inch pounds.

41. (Previously Presented) A piano hinge comprising first and second hinge leafs having alignable knuckles that define a passage into which a hinge pin fits, a two-way shape memory alloy (SMA) hinge pin at least partially disposed within the passage defined by the knuckles, the two-way SMA hinge pin being made of a NiTiInol alloy and having at least a first tab at one end portion of the two-way SMA hinge pin rigidly secured to the first hinge leaf and at least a second tab at an opposite end portion of the two-way SMA hinge pin rigidly secured to the second hinge leaf such that the piano hinge leaves do not pivot about the SMA pin but pivot when a torque is applied as the two-way SMA hinge

pin at least partially twists when the two-way SMA hinge pin changes between an austenite temperature and a martensite temperature of the NiTiNol alloy, such that torque generated by the two-way SMA hinge pin in either a clockwise or counterclockwise direction is transferred to one of the hinge leafs relative to the other of said hinge leafs, whereby the piano hinge pivots in response to the two-way SMA hinge pin twisting as the temperature of the two-way SMA hinge pin changes between the austenite temperature and the martensite temperature\_.

42. (Previously Presented) The piano hinge of claim 41, wherein the first tab is at one end portion of the two-way SMA hinge pin and the second tab is at the other end portion of the two-way SMA hinge pin, such that the partial twisting of the hinge pin applies a torque to the first tab relative to the second tab.

43. (Previously Presented) The piano hinge of claim 42, wherein the hinge pin rotates into an intermediate partially twisted configuration when a temperature of the two-way SMA is between the austenite temperature and the martensite temperature.

44. (Previously Presented) The piano hinge of claim 43, wherein the two-way SMA is configured to apply torque within a range of about 27 inch pounds and about 1740 inch pounds.

45. (Previously Presented) The hinge apparatus of claim 43, further comprising a device to cause the hinge pin to heat and switch the two-way SMA between at a first trained shape and a second trained shape.

**EVIDENCE APPENDIX**  
**UNDER 37 C.F.R. §41.37 (c)(1)(ix)**

Document

1. Final Office Action mailed Jan. 18, 2006
2. Japanese Patent JP 408228910 A
  - English translation of Abstract

7784-000704

O I P E

MDE

AFUS

Final OA

JUN 12 2006

Application No.

10796,806

Applicant(s)

MABE, JAMES H.

Office Action Summary

Due 4/18/06

Examiner

Mark A. Williams

Art Unit

3676

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

COPY

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

S-0736

- 4) ☒ Claim(s) 35-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 35-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

Scanned and

sent to:

Audrey + Kylin

Date:

1/22/06

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
- Paper No(s)/Mail Date \_\_\_\_.

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.



## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 35-45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase “the piano hinge leaves do not pivot about the SMA pin but pivot when a torque is applied” is not fully understood. It is unclear how this can occur, since even when the hinge pin twist to cause pivoting, the leaves would seem to pivot about the pin.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 35 and 36, as best understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Patent JP 408228910 A ('910). A hinge apparatus comprising a hinge pin 7 formed of a two-way shape memory alloy (SMA) adapted to transition, without an externally applied load, between a first trained shape and a second trained shape upon switching the two-way SMA between a first state and a second state, wherein switching the two-way SMA from the first state to the second state causes the hinge apparatus to apply an opening force to a device coupled to the hinge apparatus, and wherein switching the two-way SMA from the second state to the first state causes the hinge apparatus to apply a closing force to the device coupled to the hinge apparatus. First and second states of austenitic state and martensitic states, responsive to temperature as claimed, are inherent to the design, as known in the art. Twisting of the pin as claimed would inherently occur. Member 2 is broadly considered a door. The device could be formed by thermal cycling, as claimed. The device can be broadly considered a piano hinge. A key-spline arrangement rigidly securing the two-way shape memory alloy to the hinge leafs for transfer of torque from the two-way SMA. The ends of the pin including tabs for transferring torque, as claimed.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 41-43, and 45, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent JP 408228910 A ('910). Patent '910 discloses the claimed invention except for the SMA material being NiTiNol. It is known in the art of shape memory alloys to use such material as NiTiNol to achieve desired results, as evidenced by Perret, Jr., US Patent 5,617,377. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the device in this way, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. See also *Ballas Liquidating Co. v. Allied industries of Kansas, Inc.* (DC Kans) 205 USPQ 331. Such a modification is not critical to the design and would have produced no unexpected results.

Claims 37-40 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent JP 408228910 A ('910). Patent '910 discloses the claimed

invention except for the particular range of cycling. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the device in such a way, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Such a modification would solve no stated problem and would have produced no unexpected results.

### ***Response to Arguments***

5. Applicant's arguments filed 9/6/05 have been fully considered but they are not persuasive.

Applicant argues that '910 does not apply a torque in both an opening and closing direction. It is the position of the examiner that such a condition would obviously occur in '910 because of the inherent nature of SMA material. The material would twist from an original state once actuated by a temperature change, thereby causing pivoting of the hinge; then once returned back to its original temperature range, the material would twist back to its original state, thus pivoting in the hinge in the opposite direction.

Applicant argues that it would not be obvious to rigidly secure each end portion of the pin of '910 to each hinge leaf, since doing so would prevent the hinge from pivoting and would be counter-intuitive to the purposes of a conventional hinge. It is submitted that '910 is not a conventional hinge, and appears to work in the identical manner of the current invention. The term "rigid" is considered a broad term; therefore, in a broad sense, the pin is rigidly secured in the '910 patent, as claimed.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will

be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark A. Williams whose telephone number is (571) 272-7064. The examiner can normally be reached on Monday through Friday.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Williams  
11/23/05 



BRIAN E. GLESSNER  
SUPERVISORY PATENT EXAMINER

<b>Notice of References Cited</b>	Application/Control No. 10/796,806	Applicant(s)/Patent Under Reexamination MABE, JAMES H.	
	Examiner Mark A. Williams	Art Unit 3676	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,617,377	04-1997	Perret, Jr., Gerard A.	368/282
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
 Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,806	03/09/2004	James H. Mabe	7784-000704US	2080
27572	7590	01/18/2006	EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 828 BLOOMFIELD HILLS, MI 48303			WILLIAMS, MARK A	
			ART UNIT	PAPER NUMBER
			3676	

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Please find below and/or attached an Office communication concerning this application or proceeding.



***RELATED PROCEEDINGS APPENDIX***

***UNDER 37 C.F.R. §41.37(c)(1)(x)***

None.

COPY

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平8-228910

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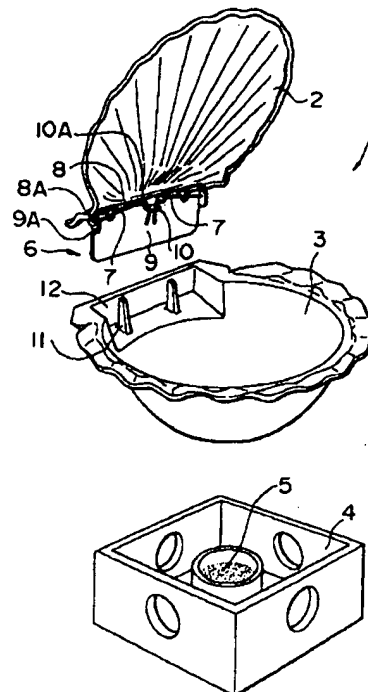
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(54) 【発明の名称】 開閉蓋付食膳用鍋

(57) 【要約】

【目的】 蓋体の開き状態でも食膳用鍋をコンロ上に安定して載置維持し、供食時には蓋体を自由に取り外せるようにする。

【構成】 食膳用の鍋体3に蝶番機構6を介して蓋体2を開閉自在に枢着し、蝶番機構6には、温度変化による形状の復原特性を用いて蓋体2を鍋体3に対し自動的に開閉させる形状記憶合金製の蓋体開閉部材7を設ける。蓋体開閉部材7による鍋体3に対する蓋体2の開き角度を係止規制するよう開閉部に拡開規制手段13を形成する。蓋体開閉部材7は所定の折曲形状を記憶させた形状記憶合金製の線材で形成し、中間軸杆部7A一端の蓋体側折曲部7Bを蓋体2側に、同じく他端の鍋体側折曲部7Cを鍋体3側に夫々係止し、加熱に伴う中間軸杆部7Aを回転軸とした蓋体側折曲部7Bと鍋体側折曲部7Cとの間の交差角度を変える相対的な振回復原力により蓋体2を開状態にする。



## 【特許請求の範囲】

【請求項1】 食膳用の鍋体と、鍋体に対し開閉部を介して開閉自在に枢着された蓋体と、鍋体、蓋体相互間の開閉部に介在されていて、温度変化による形状の復原特性を用いて蓋体を鍋体に対し自動的に開閉させる形状記憶合金製の蓋体開閉部材を有する蝶番機構とを備えている開閉蓋付食膳用鍋において、蓋体開閉部材による鍋体に対する蓋体の開き角度を係止規制するよう鍋体、蓋体のいずれかの開閉部に拡張規制手段を設けたことを特徴とする開閉蓋付食膳用鍋。

【請求項2】 拡張規制手段は、蓋体と鍋体との開き角度を90度以下に係止するよう鍋体、蓋体のいずれかの開閉部に係止突部状に形成してある請求項1記載の開閉蓋付食膳用鍋。

【請求項3】 蝶番機構は、蓋体の開閉部に固定された羽保持枠と、羽保持枠に蓋体開閉部材を介して継手部が回転可能に枢着された羽とから成り、羽は鍋体の開閉部に差し込み式に着脱可能に構成されている請求項1または2記載の開閉蓋付食膳用鍋。

【請求項4】 蓋体開閉部材は、中間軸杆部を介して端部に蓋体側折曲部と鍋体側折曲部とを有する所定の折曲形状を記憶させた形状記憶合金製の線材であって、蓋体側折曲部を蓋体側に、鍋体側折曲部を鍋体側に夫々係止させ、加熱に伴う中間軸杆部を回転軸としての蓋体側折曲部と鍋体側折曲部との間の交差角度を変える相対的な戻回復原力により蓋体を開状態にさせるようにした請求項1乃至3のいずれか記載の開閉蓋付食膳用鍋。

【請求項5】 拡張規制手段は、鍋体の開閉部側または蝶番機構の後方に突き当てられて係止されるよう蓋体の開閉部縁側に係止突部状に突設してある請求項1乃至4のいずれか記載の開閉蓋付食膳用鍋。

【請求項6】 蓋体と鍋体とで2枚貝の形状を構成する請求項1乃至5のいずれか記載の開閉蓋付食膳用鍋。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、主として旅館等においての食事の際に一人前の鍋料理等を加熱調理し、そのまま供食させられるようにした開閉蓋付食膳用鍋に関するものである。

## 【0002】

【従来の技術】 従来この種の食膳用鍋は、鉄製の取っ手の付いた鍋で木製の蓋があり、固形燃料の入ったコンロに掛けておき、煮えてきたら蓋を取って食するものや、大型のホタテ貝の殻を鍋代わりとして使用するものがある。また、実開平5-63418号公報のように、2枚貝の形状をした蓋と鍋との接合部の一方に金環を装着させ他方にフックを設けて上下の蓋と鍋とを開閉自在に構成しておき、鍋の接合部に穴を2個設け、この穴に予め蓋と鍋の開き角度に応じた形状を記憶させた形状記憶合金製のバネの一端を着脱可能となるように巻挿させ、バ

ネの他端を蓋の接合部に突当てておき、温度変化による形状の復原特性を用いて蓋を鍋に対し自動的に開閉させるものが知られている。

## 【0003】

【発明が解決しようとする課題】 ところが、上述した実開平5-63418号公報のものにおいては、温度が上昇して形状記憶合金製のバネの作用により蓋が開いた場合、鍋と蓋との開き角度に対する規制が設けられていないために開き角度が略180度となるように無制限に開いてしまい、食事中に蓋の自重でもって反り返り鍋が転倒してしまい、食べ物を無駄にしてしまうという問題点を有していた。そればかりでなく、金環、フックによって蓋を鍋に連繋してあるため、供食、洗浄、収納等に際し両者を簡単には分離できず、取扱いが非常に面倒であった。

【0004】そこで、本発明は叙上のような従来存した諸事情に鑑み創出されたもので、鍋体と蓋体との開き角度を規制させることにより、形状記憶合金における温度変化による形状の復原特性に伴う蓋体の開き状態でも食膳用鍋をコンロ上に安定して載置維持でき、また、供食時には蓋体を簡単に取り外すことができるようにした開閉蓋付食膳用鍋を提供することを目的とする。

## 【0005】

【課題を解決するための手段】 上述した目的を達成するため、本発明にあっては、食膳用の鍋体3と、鍋体3に対し開閉部を介して開閉自在に枢着された蓋体3と、鍋体2、蓋体3相互間の開閉部に介在されていて、温度変化による形状の復原特性を用いて蓋体2を鍋体3に対し自動的に開閉させる形状記憶合金製の蓋体開閉部材7を有する蝶番機構6とを備えており、蓋体開閉部材7による鍋体3に対する蓋体2の開き角度に係止規制するよう鍋体3、蓋体2のいずれかの開閉部に拡張規制手段13を設けたことを特徴とする開閉蓋付食膳用鍋1である。

【0006】また、拡張規制手段13は、蓋体2と鍋体3との開き角度を90度以下に係止するよう少なくとも鍋体3と蓋体2のいずれかの開閉部に係止突部状に形成することができる。

【0007】蝶番機構6は、蓋体2の開閉部に固定された羽保持枠8と、羽保持枠8に蓋体開閉部材7を介して継手部が回転可能に枢着された羽9とから成り、羽9は鍋体3の開閉部に差し込み式に着脱可能に構成されているものとで、蓋体開閉部材7は、中間軸杆部7Aを介して端部に蓋体側折曲部7Bと鍋体側折曲部7Cとを有する所定の折曲形状を記憶させた形状記憶合金製の線材であって、蓋体側折曲部7Bを蓋体2側に、鍋体側折曲部7Cを鍋体3側に夫々係止させ、加熱に伴う中間軸杆部7Aを回転軸としての蓋体側折曲部7Bと鍋体側折曲部7Cとの間の交差角度を変える相対的な戻回復原力により蓋体3を開状態にさせるようにして構成することができ、また、このときの拡張規制手段13は、鍋体3の

開閉部側または蝶番機構6の後方に突き当てられて係止されるよう蓋体2の開閉部縁側に係止突部状に突設して形成することができる。

【0008】更に、蓋体3と鍋体2とで2枚貝の形状を構成することができる。

【0009】

【作用】本発明に係る開閉蓋付食膳用鍋1にあって、これを例えばコンロ4上に載置して直接に煮沸することで、蓋体開閉部材7を形成する形状記憶合金製の線材は、食事に適した温度に温められて鍋体3の中の煮え具合が最良となると、加熱に伴う相対的な振回復原力により蓋体2を開状態にさせる。このとき、蓋体2と鍋体3とはあたかも2枚貝が口を開くような形態とされ、そのために趣があり、楽しい食事を採ることができる。また、鍋体3と蓋体2とは蝶番機構6の羽9を介して自由に外し、分離できるので、供食時の鍋体3からの料理の取り出し、使用後の洗浄、収納も簡単であり、使用時での鍋体3と蓋体2との組付けも羽9を単に鍋体3の開閉部に差し込むだけで容易に行なえる。

【0010】拡開規制手段13は、例えば蓋体2の開閉部側に係止突部状に突設してあり、形状記憶合金製の蓋体開閉部材7による蓋体2の開動作において、この拡開規制手段13は鍋体3の開閉部側または羽9の後方に突き当てられて係止されることで、蓋体2と鍋体3との開き角度を90度以下に保持させ、例えばコンロ4上での鍋体3の載置安定性が維持される。

【0011】

【実施例】以下、図面を参照して本発明の一実施例を説明するに、図において示される符号1は、例えば旅館等において食事の際に供する鍋物等の金属製または陶製等から成る一人前用の各種の具を備えた鍋料理を収納する開閉蓋付食膳用鍋である。この開閉蓋付食膳用鍋1自体は開閉部となる蝶番機構6を介して開閉自在で、着脱自在になっていることで分離可能な蓋体2と鍋体3とでもって、図1に示す如く例えばホタテ貝やハマグリ等の2枚貝の形状を構成している。また、符号4は中央の筒溝内に固形燃料5等が収容されているコンロであり、食膳において開閉蓋付食膳用鍋1をコンロ4に掛けたまま供食者の膳前に出されて、固形燃料5に着火させ、煮沸させて煮えてきたら鍋料理を食させるものとしてある。

【0012】図1、図3に示す如く、蓋体2の鍋体3との開閉部には、温度変化による形状の復原特性を用いて蓋体2を鍋体3に対し自動的に開閉させるよう蓋体開閉部材7を備えた蝶番機構6を設けてあり、蓋体開閉部材7としては、具体的には温度が例えば60～80℃程度で後述する所定の形状を記憶させた金-カドミウム合金、ニッケル-チタン合金、銅-亜鉛-アルミニウム合金、インジウム-タリウム合金等の形状記憶合金製の線材のものとしてある。そして、例えば図3、図4に示す如く、蓋体2の開閉部に両端に継手部としての折曲状の

軸支片8Aを有する断面コ字形の羽保持棒8を固着し、この羽保持棒8の両端の軸支片8Aに形成した軸孔8Bに、断面コ字形の羽9の両端にある継手部としての折曲状の軸支片9Aの軸孔9Bを対向させて組み込み、両軸孔8B、9Bに後述する形状を有する形状記憶合金製の前記の蓋体開閉部材7を左右で一对にして夫々介挿させることで、羽9を蓋体2に対し継手部を介して回動可能となるように枢着することで、蓋体2に連繋した蝶番機構6を形成してある。

【0013】また、羽9の略中央縁側には、蓋体開閉部材7の夫々端部を羽9自身に係止させるための舌状部10と該舌状部10両側に隣接させた突っ掛け片10Aとを形成してある。そして、図2に示す如く、鍋体3の開閉部には、後部に開閉部縁壁12を形成し、前部に一对の差込み起立片11を立設している段部状の差し込み部分を構成し、差込み起立片11と開閉部縁壁12との間にできる空隙内に羽9が着脱自在に挿入されることで蓋体2を支持し、また、鍋体3に対して蓋体2が開閉するようにしてある。

【0014】図5に示す如く、前記した形状記憶合金製の一对の蓋体開閉部材7夫々は、バネ性を付与するために略アール形状に形成した中間軸杆部7Aを介して一端に上方へ折曲した蓋体側折曲部7Bを、他端に下方へ折曲した鍋体側折曲部7Cを夫々形成して全体が段差形状を呈するようになっている。そして、中間軸杆部7Aを中心回転軸にして蓋体側折曲部7Bと鍋体側折曲部7Cとが所定の振れ角度を有するように折曲形状を記憶させてあり、また、羽9を枢着させた後の蓋体開閉部材7の蓋体側折曲部7Bを蓋体2の左右側面に係止または固定し且つ中間軸杆部7Aのアール形状の膨らみ部分が前記突っ掛け片10Aに突き当たるようにしながら鍋体側折曲部7Cを羽9の前記した舌状部10の連繋孔10Bに挿通し、鍋体側折曲部7Cを羽9中央面に係止させてあり、左右で対称的に配置形成されているものとしてある。この形状記憶合金製の一对の蓋体開閉部材7により、加熱に伴う中間軸杆部7Aを介しての蓋体側折曲部7Bと鍋体側折曲部7Cとの交差角度を90度方向（図4、図5中の矢印方向）に変える相対的な振回復原力により、蓋体開閉部材7の鍋体側折曲部7Cは羽9を押圧して蓋体2を開状態とさせるようにしている。このように、蓋体開閉部材7が左右で対称的に發揮される振回復原力を有する一对状にしてあることで、左右のバランスを保持して蓋体2の開動作を極めて円滑に、しかも、重量的に嵩張る蓋体2であっても無理なく開状態とさせることができる。

【0015】蓋体開閉部材7による鍋体3に対する蓋体2の開き角度を係止規制するよう少なくとも鍋体3、蓋体2のいずれかの開閉部に拡開規制手段13を設けてある。この拡開規制手段13は、例えば図2に示す如く、蓋体2と鍋体3との開き角度を略90度以下に係止する

よう蓋体2の開閉部後方縁側にL字形の係止突部状に形成してあり、加熱に伴う蓋体開閉部材7の振回復原力による蓋体2の開動状態において拡開規制手段13が前記鍋体3の開閉部に挿入される蝶番機構6の羽9の後方に突き当てられて係止されるように構成してある。

【0016】尚、図示を省略するが、前記蓋体開閉部材は、蓋体2と鍋体3との開閉部同士に夫々固定される2枚の平板を板面に平行な折曲部を通して一体に連結され、該折曲部に所定の折曲形状を記憶させた形状記憶合金製の蝶番を設けることにより、加熱に伴う折曲部を介しての両平板間の相対的な拡開復原力でもって蓋体2を開状態にさせるように構成しても良い。

【0017】次に、本発明に係る開閉蓋付食膳用鍋1の使用の一例を説明するに、図1に示す如く、例えば旅館等における食事の際に提示される一人前用の御膳鍋である開閉蓋付食膳用鍋1をコンロ4に掛けたままの状態を利用者の膳前に出されて、固形燃料5に着火する。温度が60～80℃程度で食べられる状態になった際に、蓋体開閉手段である形状記憶合金製の蓋体開閉部材7は、加熱に伴う中間軸杆部7Aを介しての蓋体側折曲部7Bと鍋体側折曲部7Cとの交差角度を90度方向(図4、図5中の矢印方向)に変える相対的な振回復原力により蓋体2を開状態とする。このとき拡開規制手段13により、蓋体2と鍋体3との開き角度は90度以上にならないので、コンロ4上での載置安定性を欠く様なことがなく、あたかも2枚貝が自然な状態で口を開くような形態となるために趣があり、楽しい食事を採ることができる。

【0018】また、鍋体3内の料理が供食可能な状態に十分に煮えると、蓋体2が開状態となるから、それを目印として蓋体2を鍋体3から羽9を介して自由に取り外せば良く、そのまま供食でき、また、使用後の洗浄や収納の場合でも鍋体3と蓋体2とは簡単に分離できるのである。さらに、使用時での鍋体3と蓋体2との組付けも羽9を単に鍋体3の開閉部における空隙に差し込むだけで容易に行なえる。

【0019】

【発明の効果】以上説明したように本発明によれば、蓋体2を鍋体3に対し自動的に開閉させる形状記憶合金製の蓋体開閉部材7を有する蝶番機構6を備えている開閉蓋付食膳用鍋1において、蓋体開閉部材7による鍋体3に対する蓋体2の開き角度を係止規制するよう鍋体3、蓋体2のいずれかに拡開規制手段13を設けたので、温度変化による形状の復原特性によって蓋体2が急激に開き状態となっても食膳用鍋をコンロ4上で安定的に載置維持することができ、安心して楽しい食事を採ることができる。

【0020】拡開規制手段13は、蓋体2と鍋体3との開き角度を90度以下に係止するよう少なくとも鍋体3と蓋体2のいずれかの開閉部に係止突部状に形成したの

で、形状記憶合金製の蓋体開閉部材7による蓋体2の拡開動作を簡単な構成で容易に停止させることができる。

【0021】蓋体開閉部材7は、中間軸杆部7Aを介して端部に蓋体側折曲部7Bと鍋体側折曲部7Cとを有するよう所定の折曲形状を記憶させた形状記憶合金製の線材であって、蓋体側折曲部7Bを蓋体2側に、鍋体側折曲部7Cを鍋体3側に夫々係止させ、加熱に伴う中間軸杆部7Aを回転軸としての蓋体側折曲部7Bと鍋体側折曲部7Cとの間の交差角度を変える相対的な振回復原力により蓋体3を開状態にさせるようにしてあるので、形状記憶合金特有の振回復原力の作用による蓋体2の拡開動作を確実にに行なうことができ、従来の形状記憶合金製のバネの作用よりも増してバイアス発生効率の大きな拡開動作を得ることができる。

【0022】蓋体2に連繋した蝶番機構6の羽9は鍋体3の開閉部から外れるように着脱可能に構成したので、供食、使用後の洗浄、収納等の場合に鍋体3と蓋体2とは羽9を介して自由に外すことで簡単に行なえる。さらに、使用時での鍋体3と蓋体2との組付けも羽9を単に開閉部に差し込むだけで容易に行なえる。

【0023】蓋体2と鍋体3とで2枚貝の形状を構成してあるので、あたかも2枚貝が自然な状態で口を開くような形態となるために趣があり、楽しい食事を採ることができる。

【図面の簡単な説明】

【図1】本発明の一実施例を示した使用状態における蓋体と鍋体との分離状態の全体斜視図である。

【図2】同じく蓋体と鍋体との組付状態の全体断面図である。

【図3】同じく閉蓋状態にある蝶番機構を示す蓋体一部の斜視図である。

【図4】同じく開蓋状態にある蝶番機構を示す蓋体一部の斜視図である。

【図5】同じく蓋体開閉部材の動作原理を示した斜視図である。

【符号の説明】

- |            |           |
|------------|-----------|
| 1…開閉蓋付食膳用鍋 | 2…蓋体      |
| 3…鍋体       | 4…コンロ     |
| 5…固形燃料     | 6…蝶番部材    |
| 7…蓋体開閉部材   | 7A…中間軸杆部  |
| 7B…蓋体側折曲部  | 7C…鍋体側折曲部 |
| 8…羽保持枠     | 8A…軸支片    |
| 8B…軸孔      | 9…羽       |
| 9A…軸支片     | 9B…軸孔     |
| 10…舌状部     | 10A…突っ掛け片 |
| 10B…連繋孔    | 11…差込み起立片 |

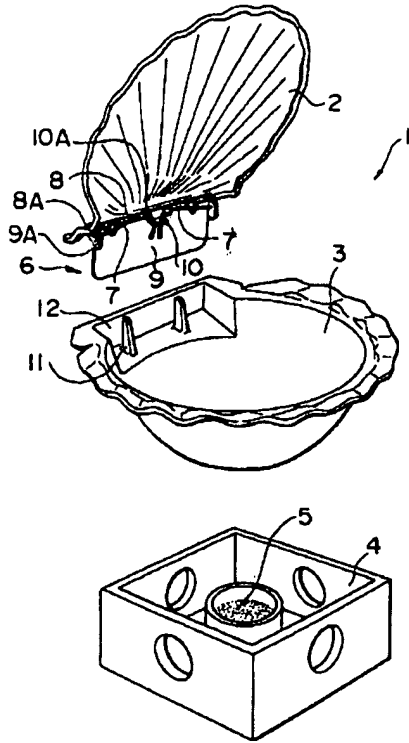
ATTORNEY  
WORK  
COPY

12...接合部縁壁

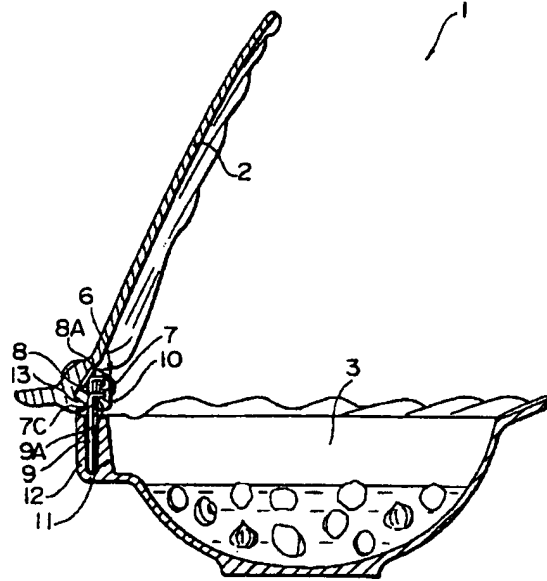
13...拡開規制

手段

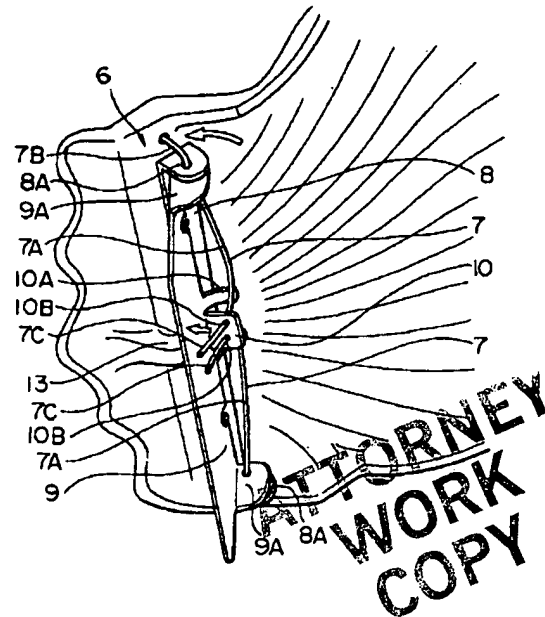
【図1】



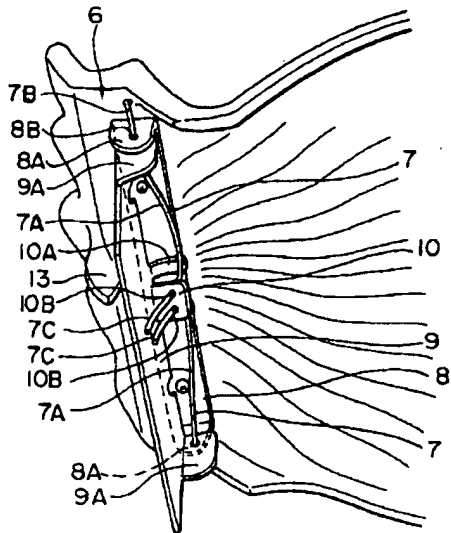
【図2】



【図4】



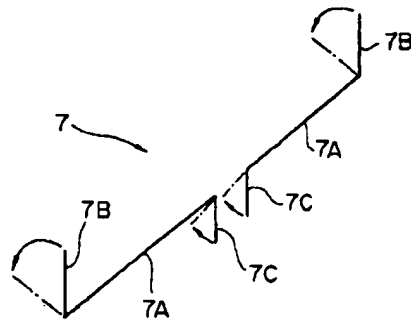
【図3】



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特開平8-228910

【図5】



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COPY

PAT-NO: JP408228910A

DOCUMENT-IDENTIFIER: JP 08228910 A

TITLE: POT FOR TABLE WITH OPENING/CLOSING  
COVER

PUBN-DATE: September 10, 1996

INVENTOR-INFORMATION:  
NAME  
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ASSIGNEE-INFORMATION:  
NAME  
NISHINO MAKIKO

COUNTRY  
N/A

APPL-NO: JP07064682

APPL-DATE: February 28, 1995

INT-CL (IPC): A47J027/00, A47J036/12

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ABSTRACT:

PURPOSE: To stably mount and maintain a pot for a table on a portable cooking stove even when a cover body is in an opened state and to freely detach the cover body at the time of eating.

CONSTITUTION: The cover body 2 is freely openably and closably and pivotally fitted to a pot body 3 for the table through a hinge mechanism 6 and the hinge mechanism 6 is provided with a cover body opening/closing member 7 made of a shape memory alloy for automatically opening and closing the cover body 2 to the pot body 3 by using the restoration characteristics of a shape by a



temperature change. An expansion control means is formed in an opening/closing part so as to lock and control the opening angle of the cover body 2 to the pot body 3 by the cover body opening/closing member 7. The cover body opening/closing member 7 is formed by a wire made of the shape memory alloy which memorized a prescribed bent shape, a cover body side bent part at one end of a middle shaft rod part is locked to the side of the cover body 2 and a pot body side bent part at the other end is locked to the side of the pot body 3, respectively. The cover body 2 is turned to the opened state by relative twisting rotation restoration force for changing a cross angle between the cover body side bent part and the pot body side bent part for which the middle shaft rod part is a rotary shaft accompanying heating.

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